

**Appendix: Stock Assessment Terms of Reference for SAW/SARC56, February 19-22, 2013**  
(To be carried out by SAW Working Groups) (v. 8/22/2012)

**A. Atlantic surfclam**

1. Estimate catch from all sources including landings and discards. Describe the spatial and temporal patterns in landings, discards, fishing effort and LPUE. Characterize the uncertainty in these sources of data.
2. Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, relevant cooperative research, etc.). Investigate the utility of commercial LPUE as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.
3. Evaluate the current **stock** definition in terms of spatial patterns in biological characteristics, population dynamics, fishery patterns, the new cooperative survey, utility of biological reference points, etc. If appropriate, recommend one or more alternative stock definitions, based on technical grounds. Integrate these results into TOR-4.
4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from TOR-3), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results. Review the performance of historical projections with respect to stock size, recruitment, catch and fishing mortality.
5. State the existing **stock status** definitions for “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; point estimates or proxies for  $B_{MSY}$ ,  $B_{THRESHOLD}$ ,  $F_{MSY}$  and  $MSY$ ) and provide estimates of their uncertainty. This should be carried out using the existing stock definition and, if possible, for the recommended “alternative” stock definitions from TOR-3. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the appropriateness of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.
6. Evaluate stock status with respect to the existing assessment model and with respect to any new assessment model. Determine stock status based on the existing stock definition and, if appropriate and if time permits, for “alternative” stock definitions from TOR-3.
  - a. When working with the existing model, update it with new data and evaluate stock status (overfished and overfishing) with respect to the existing BRP estimates.
  - b. Then use the newly proposed model and evaluate stock status with respect to “new” BRPs and their estimates (from TOR-5).
7. Develop approaches and apply them to conduct stock projections and to compute the statistical distribution (e.g., probability density function) of the OFL (overfishing level) and candidate ABCs (Acceptable Biological Catch; see Appendix to the SAW TORs).
  - a. Provide numerical annual projections (3-5 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and

probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment).

- b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions.
  - c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.
8. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in the most recent SARC reviewed assessment and review panel reports. Identify new research recommendations.

## B. White hake

1. Estimate catch from all sources including landings and discards. Describe the spatial and temporal distribution of fishing effort. Characterize the uncertainty in these sources of data. Analyze and correct for any species mis-identification in these data. Comment on the consistency of the approach to identify the catch of white hake with respect to that used in the red hake assessment.
2. Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of commercial or recreational LPUE as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.
3. Evaluate the utility of pooled age-length keys for development of a stock assessment model.
4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results. Review the performance of historical projections with respect to stock size, recruitment, catch and fishing mortality.
5. State the existing **stock status** definitions for “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; point estimates or proxies for  $B_{MSY}$ ,  $B_{THRESHOLD}$ ,  $F_{MSY}$  and  $MSY$ ) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.
6. Evaluate stock status with respect to the existing model (from previous peer reviewed accepted assessment) and with respect to a new model developed for this peer review. In both cases, evaluate whether the stock is rebuilt.
  - a. If possible update the ASPM with new data and evaluate stock status (overfished and overfishing) with respect to the relevant BRP estimates.
  - b. Then use the newly proposed model and evaluate stock status with respect to “new” BRPs and their estimates (from TOR-5).
7. Develop approaches and apply them to conduct stock projections and to compute the statistical distribution (e.g., the probability density function) of the OFL (overfishing level) and candidate ABCs (Acceptable Biological Catch; see Appendix to the SAW TORs).
  - a. Provide numerical annual projections (3-5 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for  $F$ , and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment).

- b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions.
  - c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.
- 8. Evaluate the validity of the current **stock** definition, taking into account what is known about migration among stock areas. Make a recommendation about whether there is a need to modify the current stock definition for future stock assessments.
- 9. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in the most recent SARC reviewed assessment and review panel reports. Identify new research recommendations.

## *Appendix to the SAW Assessment TORs:*

### **Clarification of Terms used in the SAW/SARC Terms of Reference**

#### **On “Acceptable Biological Catch” (DOC Nat. Stand. Guidel. Fed. Reg., v. 74, no. 11, 1-16-2009):**

*Acceptable biological catch (ABC)* is a level of a stock or stock complex’s annual catch that accounts for the scientific uncertainty in the estimate of [overfishing limit] OFL and any other scientific uncertainty...” (p. 3208) [In other words,  $OFL \geq ABC$ .]

*ABC for overfished stocks.* For overfished stocks and stock complexes, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan. (p. 3209)

NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. (p. 3180)

ABC refers to a level of “catch” that is “acceptable” given the “biological” characteristics of the stock or stock complex. As such, [optimal yield] OY does not equate with ABC. The specification of OY is required to consider a variety of factors, including social and economic factors, and the protection of marine ecosystems, which are not part of the ABC concept. (p. 3189)

#### **On “Vulnerability” (DOC Natl. Stand. Guidelines. Fed. Reg., v. 74, no. 11, 1-16-2009):**

*“Vulnerability.* A stock’s vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality).” (p. 3205)

#### **Rules of Engagement among members of a SAW Assessment Working Group:**

Anyone participating in SAW assessment working group meetings that will be running or presenting results from an assessment model is expected to supply the source code, a compiled executable, an input file with the proposed configuration, and a detailed model description in advance of the model meeting. Source code for NOAA Toolbox programs is available on request. These measures allow transparency and a fair evaluation of differences that emerge between models.